Angiographic Control During Total Excision of a Cerebral Arteriovenous Malformation

Technical Note

A. D. Bartal (Behmoaram), M.D., M. S. Tirosh, M.D., and M. Weinstein, M.D.
Department of Neurosurgery, Ichilov Municipal Hospital, Tel-Aviv Medical Center, Tel-Aviv-Jaffo, Israel

The value of angiographic control to avoid incomplete surgical treatment of cerebral aneurysms has been stressed recently. The following case of an arteriovenous malformation of the head of the caudate nucleus is presented to illustrate the need of angiographic control during, rather than after, operation to ensure a total excision of the malformation.

Case Report

A 33-year-old clerk, was admitted to the neurosurgical department on July 2, 1967, because of severe headache, intractable epileptic convulsions, and mental deterioration. He had been admitted to another hospital on two occasions for generalized seizures and conservative medical treatment. Cerebral angiography had demonstrated a deep cerebrovascular malformation (Figs. 1 and 2).

Examination. There was minimal spastic weakness of the left arm and leg. The ocular fundi were normal, visual fields full, and visual acuity 6/6 for both eyes. Skull x-rays were normal. The electroencephalogram showed bursts of spikes and sharp waves on a background of delta and theta activity over the right frontotemporal region. In spite of heavy anticonvulsive medication, the patient continued to have epileptic fits on most days.

Operation. On July 27, 1967, under endotracheal anesthesia, a right frontotemporal flap was turned down. Controlled respiration and Mannitol were used. The carotid artery was exposed in the neck. A polyethylene PE 160 catheter was advanced into the internal carotid artery for angiographic control during operation. When the dura was opened a brownish discoloration of the prefrontal cerebral cortex was noted.

The cortex was incised near the point of convergence of three abnormally large arte-

Fig. 1. Right carotid angiograms. Left: Anteroposterior view, with contralateral compression, showing the arteriovenous malformation with its drainage into the right internal cerebral vein. The right anterior cerebral artery is poorly defined. Right: Lateral views showing the malformation in the region of the head of the caudate nucleus.
ties, which were followed until a bluish mass of pulsating vessels was encountered at a depth of 4 to 5 cm. Blunt dissection of the mass was then performed during which feeding arterial vessels to the malformation were clipped and divided as they were encountered. The lateral ventricle was penetrated revealing a large saccular venous channel which connected the malformation to the internal cerebral vein. Before occlusion of the draining venous channel, a control angiogram was performed to verify that the malformation had been completely isolated from its arterial supply. This showed a remaining feeding vessel and that the fistula was still patent (Fig. 3). This vessel was occluded and the internal cerebral vein clipped. The saccular venous channel and the malformation were then removed en bloc. Repeat cerebral angiography confirmed that the lesion had been entirely removed (Fig. 4).

Postoperative Course. The patient was alert on the day after the operation and had an uneventful postoperative course. The
neurological examination was normal. The patient left the hospital on August 25, 1967, and returned to his previous occupation 1 month later.

Discussion

Removal of an arteriovenous malformation together with its venous drainage is necessary, since simple proximal clipping, or even partial excision is seldom successful in preventing symptoms, signs, or hemorrhage, which may be fatal. In our case, although complete dissection of the malformation seemed to have been performed, control angiography during the operation demonstrated a remaining feeding artery with patency of the draining fistula.

Carton and Hickey, and Riechert and Mundinger, have noted the incomplete removal of such malformations on subsequent postoperative angiography. Postoperative angiography in these instances supplies information of limited value to the surgeon since a wrongly placed clip or an incomplete excision of an arteriovenous malformation cannot then be corrected without further operative intervention.

Summary

A case in which an arteriovenous malformation of the head of the caudate nucleus was totally excised has been described in order to demonstrate and emphasize the value of angiographic control during such an operation.

References